

Design of Bearing:

Over all length=		19.36 m
Span Length=		18.75 m
C/C Girder=		2.35 m
No. of Girder=		3
Depth of girder + deck slab=		1.875 m
Wearing course=		0.075 m
DL+SIDL on Entire Bridge	=	3750 kN
Maximum LL Reaction Entire Bridge	=	885 kN

Vertical reaction for DL+SIDL	=	625.0 kN
Maximum LL Reaction	=	323.0 kN
Minimum LL Reaction	=	0.0 kN

Horizontal Load Due to Braking=	=	66.67 kN
Push/pull due to braking	=	10.21 kN

Seismic Zone =	=	IV
Zone Factor (Z) =	=	0.24
S_a / g =	=	2.50
R (for Super Structure) =	=	2.50
Importance Factor (I) =	=	1.20
Seismic coefficient $A_h = (Z/2) \times (S_a/g) \times (I/R)$ =		0.14

Maximum Horizontal Seismic force	=	175 kN
LA	=	1.174 m
Push/Pull Max	=	9 kN

(per bearing)

Load Case				Vertical Load (kN)	Corresponding horizontal load (kN)
Seismic:					
Maximum Vertical Load, P_{max}				962	208.34
Minimum Vertical Load, P_{min}				634	175.00
Non-Seismic:					
Maximum Vertical Load, P_{max}				958	61.78
Minimum Vertical Load, P_{min}				625	18.75

Temperature co-efficient=		1.17E-05 m/°C
Shrinkage co-efficient=		0.0002
Probable Maximum temperature at site		35 °C
Probable Minimum temperature at site		10 °C
Variation of temperature at site		25 °C
Depth of girder + deck slab=		3300 mm
Total thermal expansion=	(26.5x1000x0.0000117x25)=	7.751 mm
Thus, expansion in each direction, δ	(7.751/2)	7.751 mm
Movement due to shrinkage=	(26.5x1000/2x0.0002)=	2.650 mm
Total Movement =		<u>10.401 mm</u>

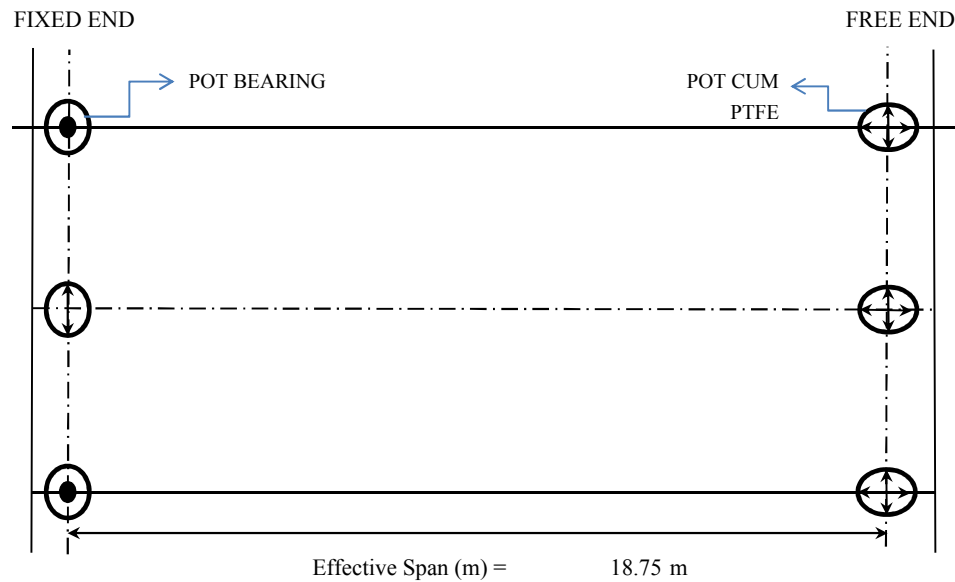
Calculation of Rotation (due to DL, SIDL & LL including Impact Factor)

Moment of inertia of girder , I	=	7.91E+11 mm ⁴
Young's modulus of Concrete, E _c =	=	25000 N/mm ²
Maximum bending moment for dead load & SIDL	=	4138 KN-m
So, rotation, $\theta_{1(DL+SIDL)}$	=	400 x Mmax x L x 10 ⁻³ /(Ec x 2.I)
	=	0.00111 radian
	=	0.064 °

Now, let us find out the maximum effect of LL due to the maximum bending moment

As per Cl. 916.3.5(2) of I.R.C. 83 (Part-II)-1987

Maximum bending moment for Live load , M _{max (LL)}	=	2050.0 KN-m
So, rotation, θ_{LL} = 400 x M _{max} x L x 10 ⁻³ /E _c .I	=	0.0011 radian
	=	0.063 °



Bearing Type	VERTICAL LOAD PER BRG. (KN)				HORIZONTAL LOAD PER BRG. (KN)				LONGITUDINAL MOVEMENT (mm)		TRANSVERSE MOVEMENT (mm)		ROTATION (RADIANs)		REMARKS
	MAXIMUM REACTION		MINIMUM REACTION		LONGITUDINAL		TRANSVERSE						PERMANENT LOADING	VARIABLE LOADING	
	NORMAL	SEISMIC	NORMAL	SEISMIC	NORMAL	SEISMIC	NORMAL	SEISMIC	+	-	+	-			
SB	958	962	625	634	-	-	-	-	6	10	0.747	0.747	0.0011	0.001	ALLOWING MOVEMENT IN BOTH THE DIRECTION
FB	958	962	625	634	62	208	-	208	-	-	-	-	0.0011	0.001	FIXED IN BOTH THE DIRECTION